

Remarks

Claims 1 and 33 are amended herein. Claims 1-18 and 33-36 will be pending upon entry of this amendment.

Support for the amendment to claim 1 is at least found in FIG. 5, Table 2, and paragraphs [0047] and [0057]. For example, in the bar graph depicted in FIG. 5 the y-axis represents "Area Coverage (%)" with a scale of 0 to 10, while the x-axis represents the individual colors of cyan, magenta, yellow, and black. Each color has two bars, one representing the coverage area ratio for 100 FPM and the other representing the coverage area ratio for 1200 FPM. Paragraph [0047] provides in part that "It is possible to quantify certain aspects of the image that show that the image is of a good quality. This information includes the surface area of the substrate which is covered by the ink." Emphasis added.

Support for the amendment to claim 33 is found at least in FIG. 4, Table 1, and at paragraph [0049]. For example, the color difference DE is defined as "the difference of a measured color from a reference sample. This quantity is typically presented as 'DE'."

The following remarks are responsive to the final Office action dated October 21, 2008 and the Advisory action dated January 16, 2009.

Response to Rejection of Claims**Claim 1**

Amended claim 1 is directed to a mass produced absorbent article. The absorbent article comprises an absorbent member adapted to retain liquid therein, at least one other component operatively connected to the absorbent member in a unit, and an image. The image includes at least one ink having the color of one of cyan, magenta, yellow and black. The image is printed in

a non-contact manner on at least a portion of the at least one other component by ink jets at a resolution of about 100 dpi with the at least one other component moving under the ink jets at a speed of at least about 30.5 mpm (100 fpm). Any area in the image having a cyan colored ink applied at maximum threshold thereto has a coverage area ratio of cyan colored ink of at least about 3%, any area in the image having a magenta colored ink applied at maximum threshold thereto has a coverage area ratio of magenta colored ink of at least about 5%, any area in the image having a yellow colored ink applied at maximum threshold thereto has a coverage area ratio of yellowed colored ink of at least about 6%, and any area in the image having a black colored ink applied at maximum threshold thereto has a coverage area ratio of black colored ink of at least about 6%, and wherein each respective coverage area ratio is the percentage of any area in the image which is covered by the corresponding cyan, yellow, magenta or black colored ink applied thereto.

As mentioned in the specification, the recited article has an image that is darker (i.e., has more vibrant color) when the image is applied at high line speeds (e.g., 100 fpm or greater) even though the output of the print heads is set to dispense an unconventionally low quantity of ink (100 dots per inch). In other words, the image on the recited article is more vibrant, brighter, and stands out better visually than those of the prior art even though it is formed at a high line speed and with less ink. See page 22, paragraph [0050] of applicants' specification. At least to the inventors, this was counterintuitive and a surprising result, the intuitive solution to increasing the line speed being to increase the ink output to keep up with the faster moving article.

In particular, as discussed at column 7, paragraph [0053] of the present application, the recited coverage area ratios represent a greater coverage area ratio than is typically achieved for a resolution of 100 dpi. The greater coverage area is achieved as a result of the higher line speed at which the printed component is moving.

Claim 1 is thus submitted to be nonobvious in view of and patentable over the references of record, and in particular, U.S. Patent No. 5,503,076 (Yeo) in view of U.S. Patent No. 4,680,645 (Dispoto et al.), in that whether considered alone or in combination the references fail to show or suggest an absorbent article comprising an image printed in a non-contact manner on at least a portion of the at least one other component by ink jets at a resolution of about 100 dpi with the at least one other component moving under the ink jets at a speed of 100 fpm, and having the claimed coverage area ratios, and wherein each respective coverage area ratio is the percentage of any area in the image which is covered by the corresponding cyan, yellow, magenta or black colored ink applied thereto.

Yeo (with particular reference to Figs. 1 and 2 thereof), discloses a multi-color printed nonwoven web laminate 10 having a fibrous nonwoven facing layer 12, a substrate layer 14 and a plurality of adhesive-inks 16. The adhesive inks 16 adhesively bond the facing layer 12 to the substrate layer 14, and impart a multi-color pattern which is visible through the nonwoven facing layer 12. Yeo further discloses that flexographic and ink-jet printing can be used to apply the adhesive inks 16.

As noted in the final Office action at page 3, Yeo does not disclose the coverage area ratios recited in claim 1. Applicants have amended claim 1 to clarify that the respective coverage area ratios are the percentages of any area in the image which is covered by the corresponding cyan, yellow,

magenta or black colored ink applied thereto. Indeed, the Office takes the position that coverage percentages are a well-known result effective variable since they are a result of the overall article size on which the color is printed.

Applicants note, however, that claim 1 recites various coverage area ratios that are a function of the total area within a graphic that contains the respective color (cyan, magenta, yellow and black), and not the size of the article as asserted by the Office. Specifically, claim 1 recites, in part, that

any area in the image having a cyan colored ink applied at maximum threshold thereto has a coverage area ratio of cyan colored ink of at least about 3%, **any area in the image** having a magenta colored ink applied at maximum threshold thereto has a coverage area ratio of magenta colored ink of at least about 5%, **any area in the image** having a yellow colored ink applied at maximum threshold thereto has a coverage area ratio of yellowed colored ink of at least about 6%, and **any area in the image** having a black colored ink applied at maximum threshold thereto has a coverage area ratio of black colored ink of at least about 6%, and wherein each respective coverage area ratio is the percentage of any area in the image which is covered by the corresponding cyan, yellow, magenta or black colored ink applied thereto. Emphasis added.

Rather, the coverage area ratio is based on the dpi used to print a particular color, the speed at which the printed component is printed, and the total area of that portion of the image over which the color is printed. There is no teaching or even a suggestion found in Yeo that such features affect the coverage area ratio of a particular color. Applicants have

inspected Yeo and have failed to find any mention therein of a coverage or surface area ratio.

The Office's position appears to be the very position rejected by the court in *In re Antonie* 195 USPQ 6 (CCPA 1977). In particular, the court noted that an assertion that it would always be obvious to one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system is improper "if there is no evidence in the record that the prior art recognized that particular parameter affected the result. *Id.* at 8 (emphasis added). Thus, the court made it clear that the recognition of a particular parameter as a result-effective variable must come from the cited reference. Yeo certainly fails to recognize that the coverage area ratio is a result-effective variable. Furthermore, Yeo is devoid of any mention of a coverage or surface area ratio.

Dispoto et al. does not add to the teachings of Yeo. Rather, Dispoto discloses a method of printing a gray scale image wherein the size of the dots being deposited onto the substrate (i.e., paper) are varied. Dispoto et al. indicate that images printed on white paper using a printer at a resolution of 100 dpi and having 16 levels of dot sizes can produce an excellent quality image. Dispoto, which was relied on solely for its teaching of printing at 100 dpi, also fails to teach or suggest the recited coverage area ratios. Nor does Dispoto recognize the coverage area ratio as being a result-effective variable. Rather, such a position is submitted to be gleaned only from the present application.

Since Yeo and Dispoto each fail to disclose or even suggest the claimed coverage area ratios, a combination of the references must also fail to disclose or suggest this feature.

Additionally, as noted in the Final Office action, Yeo fails to teach that the adhesive ink can be applied at a resolution of about 100 dots per inch (dpi) as recited in claim 1. In fact, Yeo is completely silent regarding the number of dpi used to apply the adhesive ink to the article. Even more so, Yeo is silent as to any relationship between the resolution and the line speed of the component onto which the image is printed. Dispoto et al. is completely silent as to a line speed at which the paper is moved past the print head of the printer (or the rate at which the print head itself moves over the paper). That is, one skilled in the art cannot glean from Dispoto that a 100 dpi resolution is achievable or beneficial for paper moving at the line speed recited in claim 1.

Thus, nothing in Dispoto et al. or Yeo is contrary to the conventional wisdom in the art prior to the claimed invention that printing high quality images on articles being manufactured at high line speeds (i.e., greater than 100 fpm) required high resolution (i.e., 720 dpi or greater) to produce a suitable image. It is the combination of low resolution (i.e., 100 dpi) and high line speed (i.e., 100 fpm) at which the printing is occurring that renders the claimed invention patentable over the prior art including Yeo and Dispoto et al. In other words, there is no reason evident in Yeo or Dispoto et al. from which one skilled in the art would find it obvious to print images at a low resolution (e.g., 100 dpi) onto a component moving a high line speed (i.e., 100 fpm), or otherwise predictable that such a feature would result in the recited vibrant image. Furthermore, there is simply no suggestion in either Yeo or Dispoto et al. for printing images at a low resolution (e.g., 100 dpi) onto a component having a high line speed (i.e., 100 fpm).

As set forth in the Declaration filed January 15, 2007, absorbent articles such as diapers and training pants are

typically manufactured in a line process in which the various components of the article are assembled together at high speeds such as 100 feet per minute (as mentioned in Yeo) and more often about 1,200 feet per minute or more. Prior to the present invention, due in part to print head limitations, graphic images that appear on such articles were applied by ink jet printing in an off-line process in which the graphic was imprinted on a film or non-woven web off-line, at lower speeds and over multiple passes of the web past the print head. The printed web was subsequently introduced to the manufacturing line at the higher line speed. The resolution of such images was about 300 dpi to about 600 dpi or even higher.

The quality of an image produced by a drop on demand ink jet printer has long been thought to be a function of the resolution of the image, i.e., a certain area of coverage of the substrate by the ink. The image resolution is typically defined in terms of the surface area of the web covered by a given amount of ink, and more particularly the ink dot density which is commonly given as dots-per-inch (dpi). A greater dpi has thus been associated with a greater resolution, and hence an increased quality ink jet image on the web. For example, the reference text submitted with the Declaration notes that conventional printing is typically performed at a resolution of 254-770 dpi, and for textile printing the resolution should be about 720 dpi.

The problem to be addressed by the inventors was to print at higher speeds than were available in off-line printing processes, while maintaining or increasing the resolution of the image printed on the web. Achieving this would allow the web to be printed on the main assembly line, i.e., at line speed, thereby reducing the number of processing steps, increased flexibility in changing graphics during manufacturing, and

providing other manufacturing efficiencies and cost savings. The teachings known to those skilled in the art at the time of the invention dictated that to maintain the image quality of the graphic at the desired higher line speeds, the resolution of the graphic image on the web would have to at least stay the same (e.g., 300 to 600 dpi), meaning that the print head would have to output more ink as the line speed increased. Neither Yeo nor Dispoto et al. teach or suggest otherwise.

U.S. Patent No. 6,957,884, which is incorporated by reference into the present specification at paragraph [0043], page 17 as U.S. Patent Application No. 10/330,515, also discusses the shortcomings of ink jet printers. For example, the '844 patent states that "there has been much progress in the area of piezo jet printing however, heretofore, the piezo jet printers were limited in that they were not able to handle high-speed process printing" (col. 1, lines 38-41), and "piezo jet printing apparatus currently available lack the ability to create multi-color process images at high speeds" (col. 1, line 66 through col. 2, line 1). Applicants point out that the date of the '884 patent is significantly closer to the date of the present invention than Dispoto et al. and is submitted to be more indicative of the conventional wisdom in the art at the time of this invention than Dispoto et al.

During experiments conducted by the inventors, however, the graphic produced at higher dpi (using faster print-head output and more ink) and higher line speed rates was blurred, or smeared. Also during these experiments, the inventors increased the line speed (at which the printing occurred) even further, thus exceeding the ink delivery rate capabilities of the print head to see just how high of a line speed the print head could be used with. Exceeding the capabilities of the print head certainly is not a solution that would have been obvious to one

skilled in the art. Indeed, this resulted in the image resolution dropping substantially below 300 dpi. Unexpectedly and unpredictably, the quality of the image was as good as, or better than, images previously produced at 300-600 dpi and slower line speeds and certainly better than images produced at 300-600 dpi at the higher line speeds.

As a result of their experimentation, the inventors determined that high quality images could be produced on absorbent articles moving at line speeds of 30.5 meters per minute (100 feet per minute) or greater using ink jet printing with a resolution of about 100 dots per inch (dpi). Such a result was unpredictable and unexpected in view of the previously common belief that increasing line speeds required a more rapid ink delivery rate (relative to the line speed) to the web, not a lower rate.

The position taken by the Office in this final Office action is that it would have been obvious to modify Yeo in view of the teachings of Dispoto et al. to have the recited image of Yeo printed at 100 dpi because the recited resolution according to Dispoto et al. can be used to produce an excellent quality image. The Office reiterates this position in the Advisory action. See, Advisory action at lines 6-8 "all of these limitation result from a device that is provided with the same structural elements as claimed. Therefore, these limitations, would at least be fully capable of being provided by the prior art."

However, any modification of Yeo or Dispoto et al. to accomplish the claimed features of claim 1 would be improper. The Office's proposed modification would render the cited references unsatisfactory for their intended purpose. The Federal Circuit has held that if the proposed modification would render the prior art invention being modified unsatisfactory for

its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP 2143.01 V (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (1984)).

Dispoto et al. fail to disclose the rate at which the paper moves (e.g., the line speed of the paper) past the print head and further fail to disclose or suggest any relationship between the image resolution and the line speed. Indeed, based on the commonly understood relationship between resolution, line speed and image quality at the time of applicants' invention, one would expect that the paper movement speed in Dispoto et al. would have to be relatively low (i.e., substantially slower than 100 fpm).

The Office's position thus goes against the commonly understood relationship between resolution, line speed, and image quality at the time of the applicant's invention. As discussed previously herein and in the previously attached declaration, the recited image having a resolution of 100 dpi unexpectedly provides the desired image quality that was heretofore achieved only at higher resolutions and lower line speeds. The recited reduced resolution, at higher line speeds, is counterintuitive and contrary to the teachings of the prior art and the knowledge of those skilled in the art at the time of the present invention. Accordingly, any modification of Yeo or Dispoto et al. to teach the limitations of claim 1 would render them unsatisfactory for their intended purpose.

For all of the above reasons, claim 1 is submitted to be non-obvious in view of and patentable over the references of record including Yeo in combination with Dispoto et al.

Claims 2-18 depend either directly or indirectly from claim 1 and are submitted to be patentable over the references of record for at least the same reasons as claim 1.

Claims 2 and 3

Claims 2 and 3 each depend directly from claim 1 and further recite higher coverage area ratios for cyan, magenta, yellow and black, respectively. As disclosed at Table 2 of the present application, when the printing resolution is 100 dpi, the coverage area ratio of the printed image is achieved only at higher line speeds. However, as discussed above in connection with claim 1, operating at such high line speeds while printing at a low resolution (e.g., 100 dpi) is against conventional wisdom prior the present invention.

Accordingly, for at least the same reasons set forth above in connection with claim 1, claims 2 and 3 are further submitted to be patentable over the references of record.

Claims 11 and 12

Claim 11, which depends indirectly from claim 1, further recites that the image includes multiple separable design elements, none of the design elements being smaller than about 0.64 centimeters (0.25 inches) in height. Claim 12 depends from claim 11 and further recites that one of the design elements constitutes a focal design element, the height of the focal design element being at least about 1.91 centimeters (0.75 inches).

Neither Yeo nor Dispoto et al. disclose the dimension of a design element, nor would it would have been obvious to one of ordinary skill in the art to modify Yeo or Dispoto et al. on the basis that discovering the optimum value of a result effective variable involves only routine skill in the art. See page 4 of the final Office action citing *In re Boesch and Slaney*.

Such a position appears to be the very position rejected by the court in *In re Antonie* 195 USPQ 6 (CCPA 1977). In particular, the court noted that an assertion that it would

always be obvious to one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system is improper "if there is no evidence in the record that the prior art recognized that particular parameter affected the result. *Id.* at 8 (emphasis added). Thus, the court made it clear that the recognition of a particular parameter as a result-effective variable must come from the cited reference.

In this case, neither Yeo nor Dispoto et al. teach that the dimension of the design element is a result-effective variable.

For these additional reasons, claims 11 and 12 are further submitted to be non-obvious and patentable over the references of record.

Claim 33

Amended claim 33 is directed to a mass produced absorbent article comprising an absorbent member adapted to retain liquid therein, at least one other component operatively connected to the absorbent member in a unit, and an image including at least one ink having the color of one of cyan, magenta, yellow and black, the image being printed in a non-contact manner on at least a portion of said at least one other component by ink jets at a resolution of about 100 dpi with the outer cover moving under the ink jets at a speed of at least about 30.5 mpm (100 fpm), wherein a color difference (DE*) value for any cyan colored ink in the image as compared to a background color of said at least one other component on which the image is printed is at least about 6, the DE* value for any magenta colored ink in the image has a color difference (DE*) of at least about 9, the DE* value for any yellow colored ink in the image has a color difference (DE*) of at least about 8, and the DE* value for any black colored ink in the image has a color difference

(DE*) of at least about 6, and wherein each respective color difference (DE*) is the difference for the corresponding cyan, yellow, magenta or black colored ink from a reference sample.

Claim 33 is submitted to be non-obvious in view of and patentable over the references of record, and in particular Yeo in view of Dispoto et al., for reasons similar to those discussed above in connection with claim 1. That is, whether considered alone or in combination the references fail to teach or suggest the recited absorbent article wherein the image is printed in a non-contact manner on at least a portion of the at least one other component by ink jets at a resolution of about 100 dpi with the outer cover moving under the ink jets at a speed of at least about 30.5 mpm (100 fpm), and the claimed color difference (DE*) values, and wherein each respective color difference (DE*) is the difference for the corresponding cyan, yellow, magenta or black colored ink from a reference sample.

As noted in paragraphs [0049-0052] and Table 2 of the present application, the color difference values are generally a function of the dot resolution and the speed at which the printed component is moved past the printer. The color differences claimed in claim 33 are achieved at a 100 dpi resolution by using a faster line speed than conventional wisdom would suggest as discussed above. Thus, one skilled in the art would not have been motivated to provide the recited color difference values at such a low resolution (100 dpi).

Moreover, neither Yeo nor Dispoto recognize the color differences as being a result-effective variable. Applicants previously requested clarification from the Office as to where Yeo or Dispoto disclose such matter. Applicants reiterate this request.

For the above reasons, claim 33 is submitted to be non-obvious in view of and patentable over the references of record.

Claim 34

Claim 34 depends from claim 1 and further recites that the image contains ink applied to said at least one component by the ink jet with dots having a uniform volume of ink. Support for claim 34 can be found in paragraph [0043], page 17 of the specification and in U.S. Patent Application No. 10/330,515, which is incorporated by reference into the present specification at paragraph [0043], page 17.

The crux of the invention taught by Dispoto is that the dot sizes are variable to correct errors in gray-scaling in order to achieve a 100 dpi image. In fact, Dispoto teaches the use of 16 different dot sizes to correct errors associated with gray scaling. Thus, Dispoto expressly teaches away from dots having a uniform volume of ink as recited in claim 34. Yeo lacks any teaching or suggestion whatsoever regarding the sizes of the dots used during ink jet printing. Moreover, nothing in Yeo would suggest or motivate one of ordinary skill in the art to do violence to Dispoto's invention by having uniform dot sizes.

At page 7 of the final Office action, the Office asserts that arguments previously presented by applicants and reiterated herein are directed toward functional limitations. Applicants respectfully disagree. Applicants arguments in regard to the image containing ink applied to the component by the ink jet with dots having a uniform volume of ink are not directed to functional limitations. Rather, the claimed dots having a uniform volume are inherently structural limitations as they define the amount of ink contained in the dots that are present in the image on the printed component. These features are therefore entitled to patentable weight.

As held by the CCPA, even if the prior art device performs all the functions recited in the claim (which applicants submit the references do not), the prior art cannot anticipate the

claim if there any structural differences. *In re Ruskin*, 347 F.2d 843 (1965). Accordingly, neither Dispoto et al. nor Yeo, whether considered alone or in combination, render claim 34 because of the structural differences between dots having a uniform volume of ink (as recited in claim 34) and the variable size dots of Dispoto et al.

As a result, claim 34 is submitted to be further non-obvious in view of and patentable over Yeo in combination with Dispoto et al.

Claim 35

Claim 35 depends from claim 1 and further recites that the image comprises ink dots of generally uniform size. As mentioned with respect to claim 34, Dispoto teaches the use of 16 different dot sizes to correct errors associated with gray scaling and thereby expressly teaches away from ink dots of generally uniform size as recited in claim 34. Yeo lacks any teaching or suggestion whatsoever regarding the sizes of the dots used during ink jet printing. Moreover, nothing in Yeo would suggest or motivate one of ordinary skill in the art to do violence to Dispoto's invention by having dot of generally uniform size.

At page 7 of the final Office action, the Office asserts that arguments previously presented by applicants and reiterated herein are directed toward functional limitations. Applicants respectfully disagree. Applicants arguments in regard to the image containing ink applied to the component by the ink jet with dots having a generally uniform size are not directed to functional limitations. Rather, the claimed dots having a generally uniform size are inherently structural limitations as they define the dimensions of the ink dots that form the printed

image. These features are therefore entitled to patentable weight.

As held by the CCPA, even if the prior art device performs all the functions recited in the claim (which applicants submit the references do not), the prior art cannot anticipate the claim if there any structural differences. *In re Ruskin*, 347 F.2d 843 (1965). Accordingly, neither Dispoto et al. nor Yeo, whether considered alone or in combination, render claim 35 because of the structural differences between dots having a generally uniform size (as recited in claim 35) and the variable size dots of Dispoto et al.

As a result, claim 35 is submitted to be further non-obvious in view of and patentable over Yeo in combination with Dispoto et al.

Claim 36

Claim 36 depends from claim 1 and recites that the at least one other component comprises a non-woven material, the image being disposed on the non-woven material.

Those skilled in the art of printing will readily appreciate that printing on non-woven material is more difficult than printing on standard paper because of the substantial higher void space of the non-woven material. During the printing process, a significant amount of ink is captured by the voids in the non-woven material which inhibits the ink from spreading laterally outward. Again, the conventional wisdom in the art of printing, prior to this invention, would be to add more ink to compensate for the ink being captured by the voids.

While Yeo discloses printing on non-woven material, one of ordinary skill in the art would not be motivated by Dispoto et al. to print on a non-woven material at 100 dpi because doing so goes against the conventional wisdom in the art. Dispoto et al.

is directed specifically to printing on paper which is much denser and has much less void space. As a result, it is easier to print on paper than a non-woven material because ink is not captured by the voids. Instead, it is held near the surface of the paper where it is clearly visible. Thus, it takes less ink to print on paper than on non-woven material to achieve the same or nearly the same quality image. Accordingly, one of ordinary skill in the art at the time of this invention would not print on a non-woven as taught by Yeo at a high line speed and 100 dpi as disclosed by Dispoto et al. because the skilled artist would have believed a significantly greater dpi would be necessary to achieve a quality image.

For these additional reasons, claim 36 is submitted to be further non-obvious in view of and patentable over Yeo in combination with Dispoto et al.

Conclusion

In view of the foregoing, applicants respectfully request allowance of this application.

The Commissioner is hereby authorized to charge a one-month extension-of-time fee (\$130) to Deposit Account No. 12-384 and to charge any deficiency or overpayment of any fees to Deposit Account No. 12-384.

Respectfully submitted,

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